

IN THE CLAIMS:

Claims 27, 73, 75 and 80 are amended herein. New claims 81 through 87 are added. Please note that all claims currently pending and under consideration in the referenced application are shown below. Please enter these claims as amended. This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1-26. (Cancelled)

27. (Currently Amended) A method of establishing electrical contact between a semiconductor substrate and a semiconductor device, comprising:
providing a substrate with an overlying insulating layer;
etching a hole through the insulating layer to the substrate;
introducing doped polycrystalline silicon into the hole;
introducing at least one titanium layer within the hole over the doped polycrystalline silicon;
introducing at least one non-titanium layer over the at least one titanium layer and within the hole;
providing an oxidation barrier over the non-titanium layer and within the hole;
siliciding the titanium layer;
nitridizing the non-titanium layer by exposing the non-titanium layer to a N₂/NH₃ ambient at a temperature of about 360°C; and
forming the semiconductor device over the non-titanium layer oxidation barrier.

28-72. (Cancelled)

73. (Currently amended) The method of claim 27, further comprising exposing the non-titanium layer to a N₂/NH₃ ambient under a pressure of approximately 4.5 torr.

74. (Original) The method of claim 27, wherein exposing the non-titanium layer to a N₂/NH₃ ambient comprises exposing a tungsten layer to a N₂/NH₃ ambient.

75. (Currently amended) The method of claim 27, wherein introducing doped polycrystalline silicon into the hole comprises filling the hole with doped polycrystalline silicon and subsequently removing a portion of the doped polycrystalline silicon from the hole.

76. (Original) The method of claim 75, wherein removing a portion of the doped polycrystalline silicon comprises etching the doped polycrystalline silicon.

77. (Original) The method of claim 27, further comprising siliciding the titanium layer prior to introducing at least one non-titanium layer over the at least one titanium layer and within the hole.

78. (Original) The method of claim 27, wherein introducing at least one titanium layer comprises selectively depositing the titanium layer on the polycrystalline silicon through chemical vapor deposition.

79. (Original) The method of claim 27, wherein siliciding the titanium layer comprises exposing the semiconductor substrate to TiCl₄ with a reactive gas and a carrier gas at a temperature about 400° C in a reaction chamber under a pressure of approximately 0.2 to 2 torr while an rf voltage is applied to the reaction chamber.

80. (Currently amended) The method of claim 27, further comprising providing an oxidation barrier between the non-titanium layer and the semiconductor device is selected from the group consisting of rhenium, iridium, osmium, palladium, platinum, and rhodium.

81. (New) A method of establishing electrical contact between a semiconductor substrate and a semiconductor device, comprising:

providing a substrate with an overlying insulating layer;

etching a hole through the insulating layer to the substrate;

introducing doped polycrystalline silicon into the hole;

introducing at least one titanium layer within the hole over the doped polycrystalline silicon;

introducing at least one non-titanium layer over the at least one titanium layer and within the hole;

siliciding the titanium layer by exposing the semiconductor substrate to TiCl₄ with a reactive gas and a carrier gas at a temperature about 400° C in a reaction chamber under a pressure of approximately 0.2 to 2 torr while an rf voltage is applied to the reaction chamber;

nitridizing the non-titanium layer by exposing the non-titanium layer to a N₂/NH₃ ambient at a temperature of about 360°C; and

forming the semiconductor device over the non-titanium layer.

82. (New) The method of claim 81, further comprising exposing the non-titanium layer to a N₂/NH₃ ambient under a pressure of approximately 4.5 torr.

83. (New) The method of claim 81, wherein exposing the non-titanium layer to a N₂/NH₃ ambient comprises exposing a tungsten layer to a N₂/NH₃ ambient.

84. (New) The method of claim 81, wherein introducing doped polycrystalline silicon into the hole comprises filling the hole with doped polycrystalline silicon and subsequently removing a portion of the doped polycrystalline silicon from the hole.

85. (New) The method of claim 84, wherein removing a portion of the doped polycrystalline silicon comprises etching the doped polycrystalline silicon.

86. (New) The method of claim 81, further comprising siliciding the titanium layer prior to introducing at least one non-titanium layer over the at least one titanium layer and within the hole.

87. (New) The method of claim 81, wherein introducing at least one titanium layer comprises selectively depositing the titanium layer on the polycrystalline silicon through chemical vapor deposition.